

WHAT IS CLAIMED IS:

1. A method of transforming a file of digital color data representing a color image to a new file of digital color data where one or more colors have been transformed to one or more new color locations where their reproduction is known to be preferred, said method comprising the steps of:

(a) providing the digital color data in a multi-dimensional color space;

(b) specifying one or more preferred color locations in the color space as one or more color magnets, wherein each color magnet has a predetermined region of influence;

(c) calculating color space distance between one or more color locations of the digital color data in the color space and one or more of the color magnets;

(d) prescribing a particular activity for each color magnet that affects color locations in the color space within the region of influence of each color magnet; and

(e) mapping the digital color data to or toward new locations in the multi-dimensional color space as a function of the color space distance and the activity, wherein the degree or strength of activity is a function of at least the color space distance or direction in color space.

2. The method as claimed in claim 1 wherein said activity specified in step (d) includes at least one activity selected from the group including attraction, repulsion, shielding and dragging.

3. The method as claimed in claim 2 wherein in the activity of attraction the color magnet attracts colors to or toward itself.

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4. The method as claimed in claim 2 wherein in the activity of repulsion the color magnet repels colors from itself.

5. The method as claimed in claim 2 wherein in the activity of shielding the color magnet shields nearby colors from the effects of other color magnets.

6. The method as claimed in claim 2 wherein in the activity of dragging the color magnet itself moves in the color space, dragging nearby colors along with it in a prescribed and smoothly varying manner.

7. The method as claimed in claim 1 wherein the preferred color location is selected from the group including a point, line, plane, or cylinder in the color space.

8. The method as claimed in claim 1 wherein the preferred color location is known to a viewer of the color image to be preferably reproduced in a particular accurate colorimetric manner relative to other renderings of that color.

9. The method as claimed in claim 8 wherein the preferred color location includes at least one of sky, foliage and skin tones.

10. The method as claimed in claim 1 wherein the multi-dimensional color space is CIELab/CIELCh color space.

11. The method as claimed in claim 1 wherein the multi-dimensional color space is CIELUV color space

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12. The method as claimed in claim 1 wherein the multi-dimensional color space is any color space wherein the dimensions correspond to perceptual attributes of color for human observers, including one or more of lightness, brightness, chroma, colorfulness, saturation and hue.

13. The method as claimed in claim 1 wherein step (c) introduces anisotropic behavior into the calculation of color space distance by allowing for separate weightings in one or more of the dimensions of the multi-dimensional color space.

14. The method as claimed in claim 1 wherein step (e) introduces anisotropic behavior into the mapping by allowing for separate degrees or strengths of activity in one or more of the dimensions of the multi-dimensional color space.

15. A computer program product for transforming a file of digital color data representing a color image to a new file of digital color data comprising: a computer readable storage medium having a computer program stored thereon for performing the steps of:

(a) providing the digital color data in a multi-dimensional color space;

(b) specifying one or more preferred color locations in the color space as one or more color magnets, wherein each color magnet has a predetermined region of influence;

(c) calculating color space distance between one or more color locations of the digital color data in the color space and one or more of the color magnets;

(d) prescribing a particular activity for each color magnet that affects color locations in the color space within the region of influence of each color magnet; and

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(e) mapping the digital color data to new locations in the multi-dimensional color space as a function of the color space distance and the activity, wherein the degree or strength of activity is a function of the color space distance or direction in color space, thereby transforming the digital color data to or toward new color locations where their reproduction is known to be preferred.

16. The computer program product as claimed in claim 15 wherein said activity specified in step (d) includes at least one activity selected from the group including attraction, repulsion, shielding and dragging.

17. The computer program product as claimed in claim 16 wherein in the activity of attraction the color magnet attracts colors to or toward itself.

18. The computer program product as claimed in claim 16 wherein in the activity of repulsion the color magnet repels colors from itself.

19. The computer program product as claimed in claim 16 wherein in the activity of shielding the color magnet shields nearby colors from the effects of other color magnets.

20. The computer program product as claimed in claim 16 wherein in the activity of dragging the color magnet itself moves in the color space, dragging nearby colors along with it in a prescribed and smoothly varying manner.

21. The computer program product as claimed in claim 15 wherein the preferred color location is selected from the group including a point, line, plane, or cylinder in the color space.

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22. The computer program product as claimed in claim 15 wherein the preferred color location is known to a viewer of the color image to be preferably reproduced in a particular accurate manner relative to other renderings of that color.

23. The computer program product as claimed in claim 22 wherein the preferred color location includes at least one of sky, foliage and skin tones.

24. The computer program product as claimed in claim 15 wherein the multi-dimensional color space is CIELab/CIELCh color space.

25. The computer program product as claimed in claim 15 wherein the multi-dimensional color space is CIELUV color space

26. The computer program product as claimed in claim 15 wherein the multi-dimensional color space is any color space wherein the dimensions correspond to perceptual attributes of color for human observers, including one or more of lightness, brightness, chroma, colorfulness, saturation and hue.

27. The computer program product as claimed in claim 15 wherein step (c) introduces anisotropic behavior into the calculation of color space distance by allowing for separate weightings in one or more of the dimensions of the multi-dimensional color space.

28. The computer program product as claimed in claim 15 wherein step (e) introduces anisotropic behavior into the mapping by allowing for separate degrees (strengths) of activity in one or more of the dimensions of the multi-dimensional color space.

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29. A system for transforming a file of digital color data representing a color image to a new file of digital color data, said system comprising:

means for providing the digital color data in a multi-dimensional color space;

means for specifying one or more preferred color locations in the color space as one or more color magnets, wherein each color magnet has a predetermined region of influence and a particular activity that affects color locations in the color space within its region of influence;

a processor for (a) calculating color space distance between one or more color locations of the digital color data in the color space and one or more of the color magnets and (b) mapping the digital color data to new locations in the multi-dimensional color space as a function of the color space distance and the activity, wherein the degree or strength of activity is a function of the color space distance or direction in color space, thereby transforming the digital color data to new color locations where their reproduction is known to be preferred.

30. The system as claimed in claim 29 wherein said activity specified includes at least one activity selected from the group including attraction, repulsion, shielding and dragging.

31. The system as claimed in claim 30 wherein in the activity of attraction the color magnet attracts colors to or toward itself.

32. The system as claimed in claim 30 wherein in the activity of repulsion the color magnet repels colors from itself.

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33. The system as claimed in claim 30 wherein in the activity of shielding the color magnet shields nearby colors from the effects of other color magnets.

34. The system as claimed in claim 30 wherein in the activity of dragging the color magnet itself moves in the color space, dragging nearby colors along with it in a prescribed and smoothly varying manner.

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